

What is claimed is:

1. A plasma processing method comprising the step of:  
etching a silicon layer of an object to be processed  
5 by employing a patterned mask and by using a plasma of a  
processing gas introduced into an airtight processing  
chamber, containing a gaseous mixture of HBr, O<sub>2</sub> and SiF<sub>4</sub>  
and, additionally, one or both of SF<sub>6</sub> and NF<sub>3</sub>,  
wherein a gas containing C and F is further added to the  
10 processing gas.
2. The plasma processing method of claim 1, wherein the  
gas containing C and F is one or more gases selected from  
the group consisting of CF<sub>4</sub>, C<sub>4</sub>F<sub>8</sub>, C<sub>5</sub>F<sub>8</sub>, C<sub>4</sub>F<sub>6</sub>, CHF<sub>3</sub> and CH<sub>2</sub>F<sub>2</sub>.  
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3. The plasma processing method of claim 1, wherein the  
gas containing C and F is added to the processing gas in a  
middle of the etching step.
- 20 4. The plasma processing method of claim 3, wherein the  
gas containing C and F is continuously added to the  
processing gas until the end of the etching step.
- 25 5. The plasma processing method of claim 1, wherein the  
gas containing C and F is added to the processing gas for a  
period of time during the etching step.

6. The plasma processing method of claim 1, wherein the timing of starting to add the gas containing C and F to the processing gas is determined according to the opening 5 diameter of holes or the opening width of grooves formed by the etching step.

7. The plasma processing method of claim 1, wherein the opening diameter of holes or the opening width of grooves 10 formed by the etching step is smaller than or equal to about 0.2  $\mu$ m.

8. The plasma processing method of claim 1, wherein the patterned mask includes at least an oxide layer containing 15 silicon.